2 Sheets—Sheet 1.

C. J. ELLIOTT & H. B. McCOOL.

Oscillating-Valves.

No. 216,030. Patented June 3, 1879.

FIG. 1.

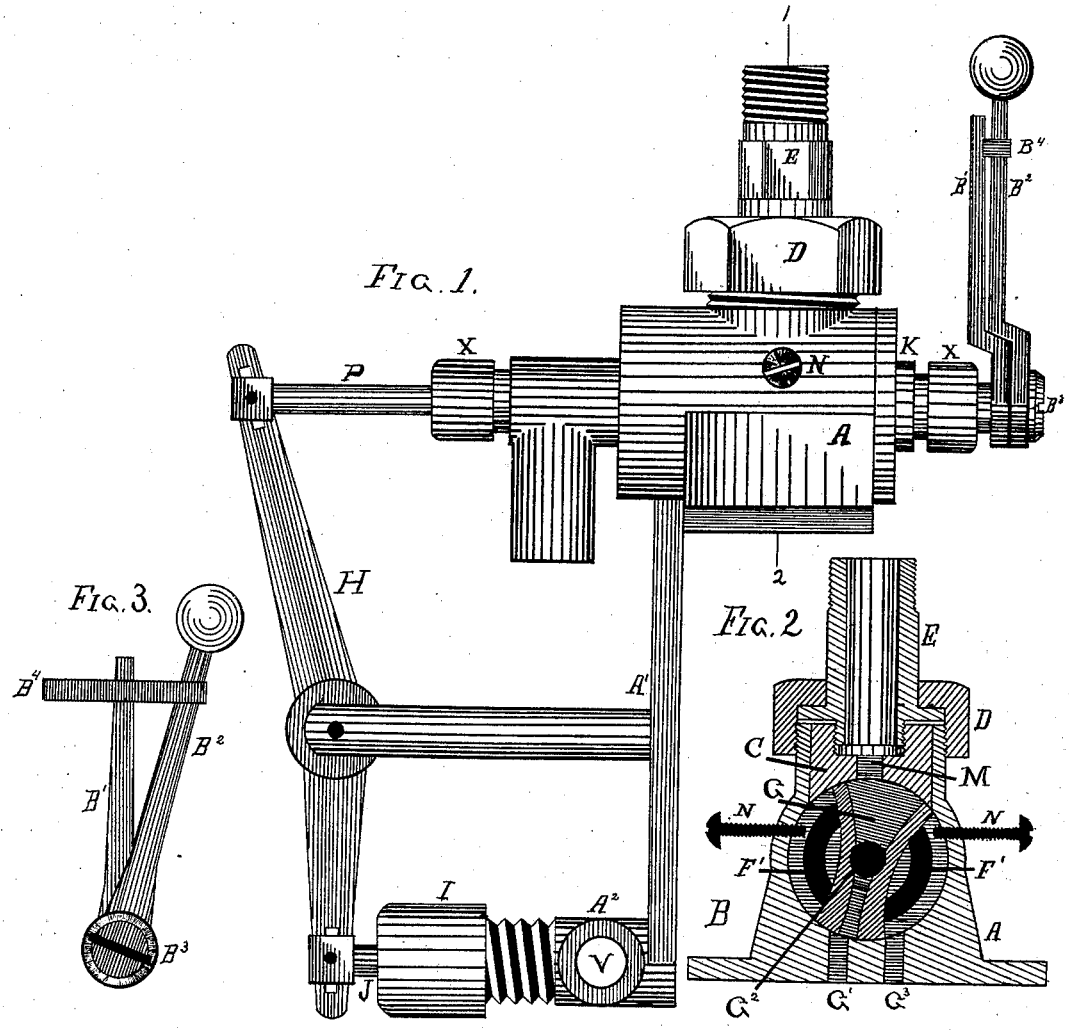

FIG. 3.

FIG. 2.

ATTEST:

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George H Whitney

INVENTORS:

Charles J. Elliott

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2 Sheets—Sheet 2.

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FIG. 4.

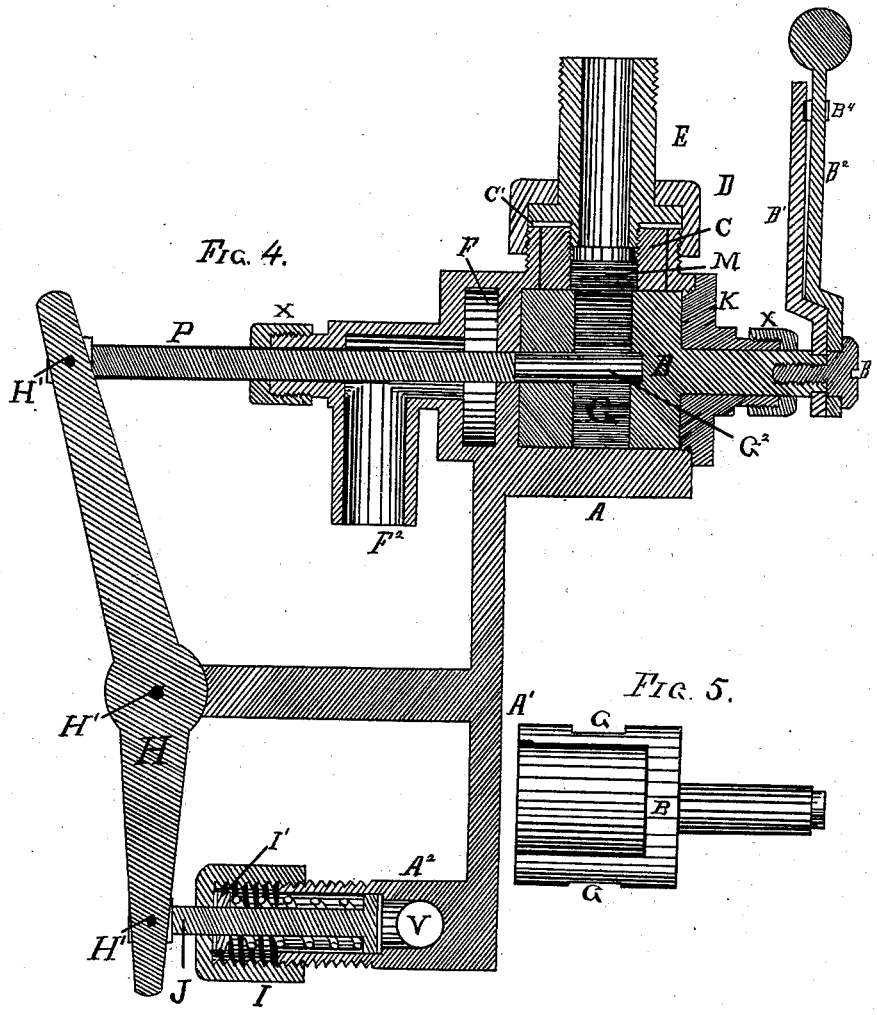

FIG. 5.

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Charles J. Elliott.

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UNITED STATES PATENT OFFICE.

CHARLES J. ELLIOTT AND HORACE B. McCOOL, OF POTTSVILLE, PA.

IMPROVEMENT IN OSCILLATING VALVES.

Specification forming part of Letters Patent No. **216,030**, dated June 3, 1879; application filed April 14, 1879.

To all whom it may concern:

Be it known that we, CHARLES J. ELLIOTT and HORACE B. McCOOL, both of Pottsville, in the county of Schuylkill and State of Pennsylvania, have invented a new and useful Improvement in Oscillating Valves for Steam, Air, or Water Engines or Motors, of which the following is a specification.

The invention relates to valves for steam, water, or air engines or machines.

In the past such valves have been so constructed that the frictional or bearing surfaces have been very large. The pressure of steam, water, or air on the valve has been great, and separate exhaust-ports have been required to empty the cylinder. The objections to the large frictional surfaces and the pressure of steam, &c., on the valve are self-evident to all persons versed in the elements of steam-engineering. The necessity of having a separate exhaust-port entails additional expense, creates complication of mechanism, and the travel of steam, air, or water from the cylinder to the exhaust-port, which, of necessity, must pass over part of the valve-surface or its seating, corrodes and wears the surfaces of these parts, thereby impairing their efficiency to a considerable extent.

The object of our invention is to provide a valve that has the smallest possible amount of friction, that will have little or no pressure on it, that will work smoothly and easily, that is so constructed as to have all lost motion by wear taken up readily, that will not stick on its center, that can be so adjusted as to exhaust full before taking steam, or the exhaust can be adjusted twice the size of the inlet, thus giving perfect clearance, that when used on air-compressors or similar machines is self-regulating, and that is compact and durable in all its parts.

The invention consists in the construction and arrangement of an oscillating valve having a single passage-way through it, working in a suitable casing having ports or passages, as shown in the drawings, in connection with devices for carrying the valve over its center, for taking up lost motion, and for opening and closing the valve when used on air-compressors or similar machines; and it finally consists in the particular construction and arrangement of the mechanism, as shown in the drawings, and more fully described hereinafter.

In the accompanying drawings, in which similar letters of reference indicate like parts, Figure 1 is a full view of our invention; Fig. 2, a sectional view of valve and casing through the line 1 2; Fig. 3, a full view of the device for carrying the valve over its center; Fig. 4, a vertical longitudinal section of Fig. 1, and Fig. 5 a full view of the valve B.

The casing A is bored out to fit the valve B. The bearing-piece C is fitted in the top of the casing A, and fitted snugly on the top of the valve B. The sleeve E, having a collar, is screwed into the bearing-piece C, and the nut D is then screwed down to the casing A. An elastic washer, C′, being inserted between the collar on the sleeve E and the casing A, makes a steam-tight joint. Through the bearing-piece C is run a passage-way, M, which should coincide with the passage-way G in B. The recess or space F communicates with the inside of the casing A by means of the passages F^1 F^1, and also communicates with the exhaust-pipe F^2.

X and X are stuffing-boxes serving to hold packing and make steam-tight joints. K is a head to the valve-casing A, and may be screwed or flanged and bolted to the casing. The stem of the valve B is squared at the end, and the lever B^1 is fitted on it. The weighted lever B^2 is secured to the valve-stem by the set-screw B^3, and works easily on the set-screw and through the yoke-band B^4. The stem P is made to work easily but steam-tight through the stuffing-box X, and continues through the exhaust-pipe F^2, and when pushed in is intended to fit the horizontal hole G^2 in the valve B.

Y shows a passage through a two, three, or four way piece, which is intended to connect with the cylinders or receiver, or both, of an air-compressor or similar machine.

J is a piston working in one of the ways of the two, three, or four way piece A^2, and around the stem of which a spiral spring is adjusted. I′ is a washer fitted against one end of the spiral spring, and having packing or elastic washer back of it. On the head of the piston another elastic washer is placed.

I is a screw-cap answering the purpose of a stuffing-box for the piston-stem J, and also for

an adjuster for compressing or releasing the spiral spring. H is a double lever pivoted at H′ H′ H′, and connects the piston J and stem P. The loose weighted lever B^2 and the fixed lever B^1, which move and operate the valve, are intended to be moved or operated by a sliding bar, or any other suitable mechanism, attached to the piston-rod or any other suitable part of the engine to which the valve is attached. The mechanism required to operate these levers is simple and must of necessity vary under different circumstances; and as it forms no part of the invention we do not represent it in the drawings.

The operation of the device is simple and is as follows: We will suppose the valve to be operated with steam. The steam enters the sleeve E and passes through the passage in the bearing-piece C into the passage G in the valve B.

By referring to Fig. 2 it will be observed that the valve is adjusted so that the left-hand port G^1 is half-way open, while the port G^3 is exhausting full. The steam passes into the cylinder through the port G^1, and when the piston is driven the required distance the levers B^2 and B^1 are operated by whatever appliance may be used. The valve is reversed and the port G^3 becomes the inlet, and the port G^1 the exhaust, port. The exhaust-steam coming out of the ports passes alongside of the valve B, passes through the passage F^1, and thence out through the exhaust-pipe F^2.

It will be observed that the space for exhaust is twice as large as the inlet-space, thus giving perfect clearance to the exhaust, and entirely doing away with the necessity of driving out the exhaust, which is the case when inlet and exhaust ports are of one size. By screwing the set-screws N N in or out the stroke of the valve B is increased or diminished.

By referring to Fig. 2 it will be seen that the exhaust opens before the inlet takes steam. This will prevent the locking or sticking of the valve, and enables it to be operated with a lower steam-pressure than ordinary valves. The communication between the steamway M and the steamway in the valve is never closed, but is open full at all times; thus there is no live steam-pressure on the valve outside of the steamway G at any time.

Should any lost motion occur between the valve and the casing in which it works, it can be taken up by screwing the sleeve E down, which will move the bearing-piece C down on the valve B.

The construction of the valve B, having very small bearing-surfaces, reduces the friction very materially.

In operating the levers B^2 and B^1 the lever B^2 is the one moved by the sliding bar or other mechanism used. It moves until it strikes one end of the yoke B^4 before it moves the lever B^1, and consequently it must be over the center before B^1 reaches it. The weight then will of itself carry B^1 over, and B^1 being connected directly to the valve B it will of necessity carry the valve over the center.

The regulating device is a component and important part of the valve, although when the valve is used for ordinary engines and some other purposes it is not necessary to use that part of the invention; but for air-compressors or similar machines, where it is necessary to keep up the pressure in the receiver to any certain number of pounds, its use is important and labor-saving.

The piston J is held in position by the spiral spring, and the screw-cap I regulates the pressure on the spring to any degree desired by either screwing it forward or back on A^2.

When the piston is in position, as shown in Fig. 4, the double lever H holds the stem P, as shown in same figure; but when the pressure of air in A^2, which is in communication with the receiver, is raised to a greater degree than the tension on the spiral spring, the piston J is pushed back, which, acting on the double lever H, pushes the stem P into the hole G^2 in the valve B, thereby closing the steam-passage G through the valve B, and no steam being allowed to pass the valve, the engine or compressor of course stops. When the air-pressure at A^2 becomes less than the tension on the spring, the spring forces the piston back to its former position, and the double lever H draws the stem P back, thus opening the steam-passage in the valve and allowing the engine or compressor to work. Thus by means of the spring and regulating device any pressure may be maintained that is desired.

What we claim is—

1. An oscillating valve having a single steam-passage, and provided with a loose weighted and a yoked fixed lever for carrying it over the center, an adjustable bearing-piece, and a spring and lever regulating device, substantially as shown and described.

2. In an oscillating valve, the combination of the casing A, the valve B, the fixed lever B^1, with yoke B^4, the weighted lever B^2, bearing-piece C, the collared piece or sleeve E, with washer C′, and the nut D, substantially as shown and described.

3. In an oscillating valve, the combination of the valve B, the fixed lever B^1, with yoke B^4, the weighted lever B^2, and the set-screw B^3, for moving and operating the valve, substantially as shown and described.

4. In an oscillating valve, the combination of the valve B, the regulating set-screws N N, the exhaust ways F^1 F^1, the recessed chamber F, and exhaust-pipe F^2, substantially as shown and described.

5. In an oscillating valve, the combination of the valve B, regulating-screws N N, steamway G, ports G^1 G^3, and exhaust-passages F^1 F^1, constructed and arranged for the purpose of opening and controlling the inlet and exhaust ports to any desired degree, substantially as shown and described.

6. In an oscillating valve, the combination of the casing A, its parts, and the valve B, with its operating mechanism, in connection with the regulating device, consisting of the two, three, or four way piece A^2, the screw-cap I, the double lever H, pivoted at H′ H′ H′, the piston J, with its spiral spring and washer I′, and the stem P, operating and constructed substantially as shown and described.

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HORACE B. McCOOL.

Witnesses:
S. L. McCool,
B. Pryson McCool.